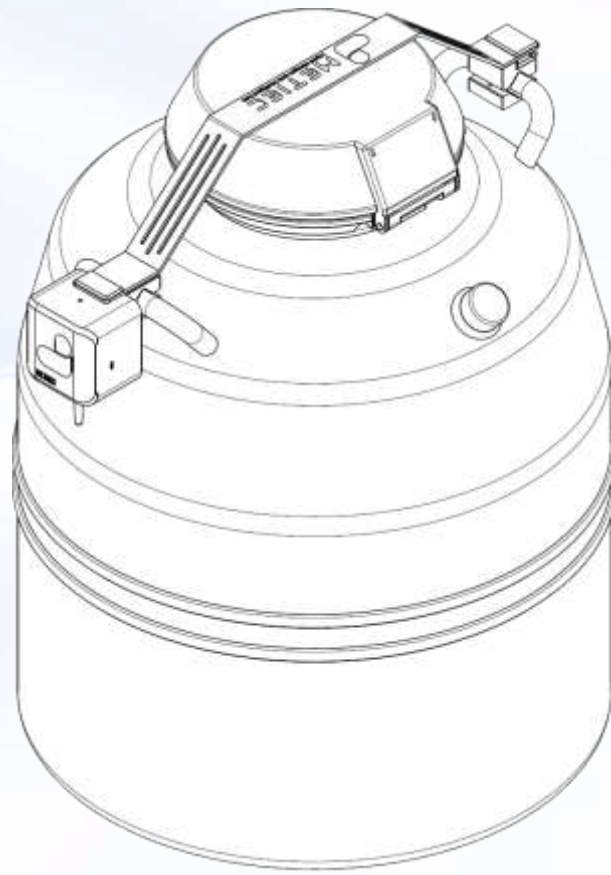# MT200LM

Liquid Nitrogen Tank Monitoring Series

Operation and Installation Manual

METIEC

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[Production Address]: No.1 Workshop, 1F, Building B10, Wuhan Hi-Tech Medical Device Park, No. 818 Gaoxin Avenue, East Lake Hi-Tech Development Zone, Wuhan, Hubei, China

[After-Sales Service Unit]: Wuhan Huchuang Union Technology Co., Ltd.

Date of Approval and Revision: July 3, 2017

Contents

1 Overview

1.1 Operation Instructions of Manual

1.1.1 It is not allowed to print or disclose any content of this Manual, including pictures and audio products, under any name without the consent of Huchuang Union;

1.1.2 The equipment operator may copy some sections of this Operation Manual for internal use only, such as for instructing the user how to deal with emergencies. These sections are clearly listed in the catalogue of this manual;

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1.2 Overview

MT200LM device is mainly used for the management of liquid nitrogen tank under experimental monitoring, adding fingerprint verification function to facilitate the warehousing and delivery management of the samples in the liquid nitrogen tank; and integrating liquid nitrogen level monitoring function to achieve low level alarm; equipped with two external temperature sensors: one sensor is used to detect tank wall temperature, and the other is used to detect room temperature; it will give liquid nitrogen leakage alarm (optional) according to the temperature difference.

1.3 Environmental Requirements

1.3.1 Only for indoor use, no high temperature, moisture, water or dust;

1.3.2 Atmospheric pressure: 70kPa～105kPa;

1.3.3 Working ambient temperature of MT200LM main unit: 0℃～+50℃;

1.3.4 Storage ambient temperature: 0℃～+50℃;

1.3.5 Relative humidity in the working environment: 0%～80% (non-condensing);

1.3.6 Power adapter (input: AC100V ~ 240V, 50/60Hz; output: 5V, 2.1A, 10.5W);

1.4 Environmental Protection Instructions

1.4.1 MT200LM contains reusable materials, and its components can be recycled after being cleaned and sterilized.

1.4.2 During recycling and handling MT200LM, it is recommended that the company's technical personnel dismantle it and recycle it according to different waste groups;

1.4.3 According to national regulations, the compositions of the main raw materials of M200LM equipment shall be are shown in (Table 1).
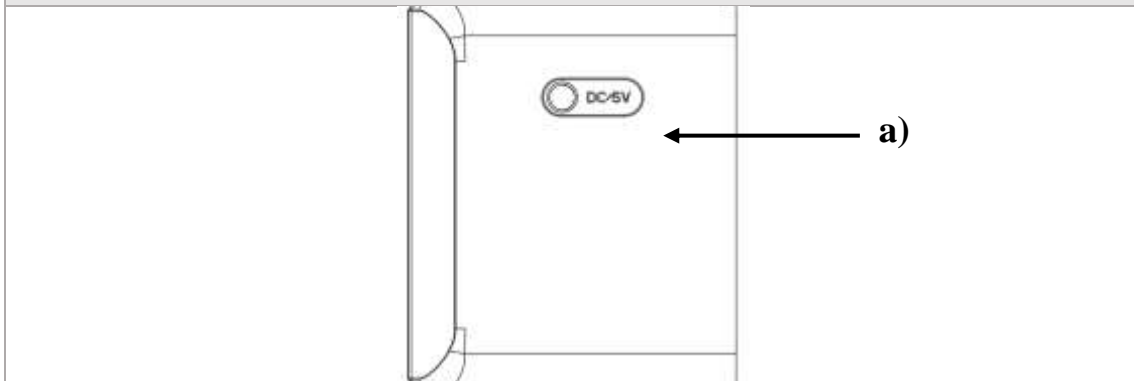
Table 1 Compositions of M200LM Main Raw Materials

Name	Composition
Casing	ABS+PC
Sheet metal	Steel
Battery	Polymer lithium battery
PCB	Including electrical components

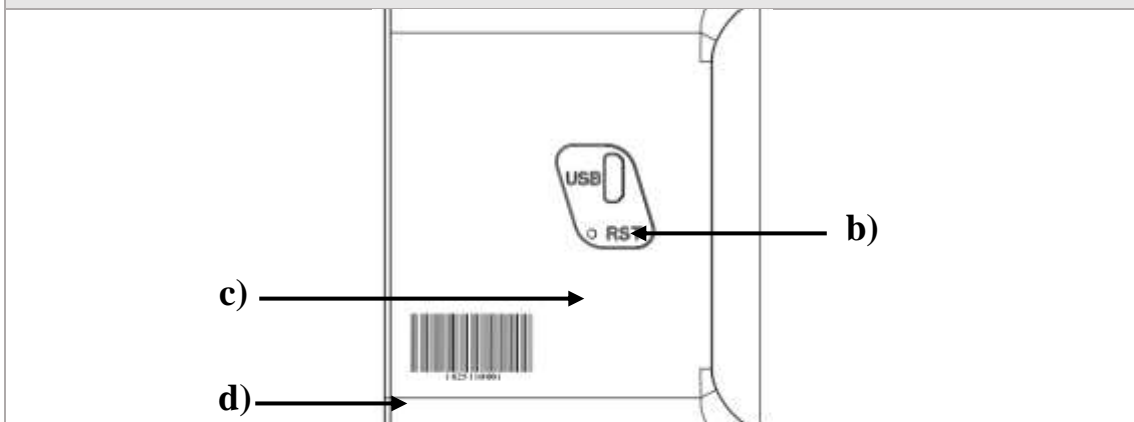## 2   Structure Features and Equipment Parameters

2.1   Structure Features

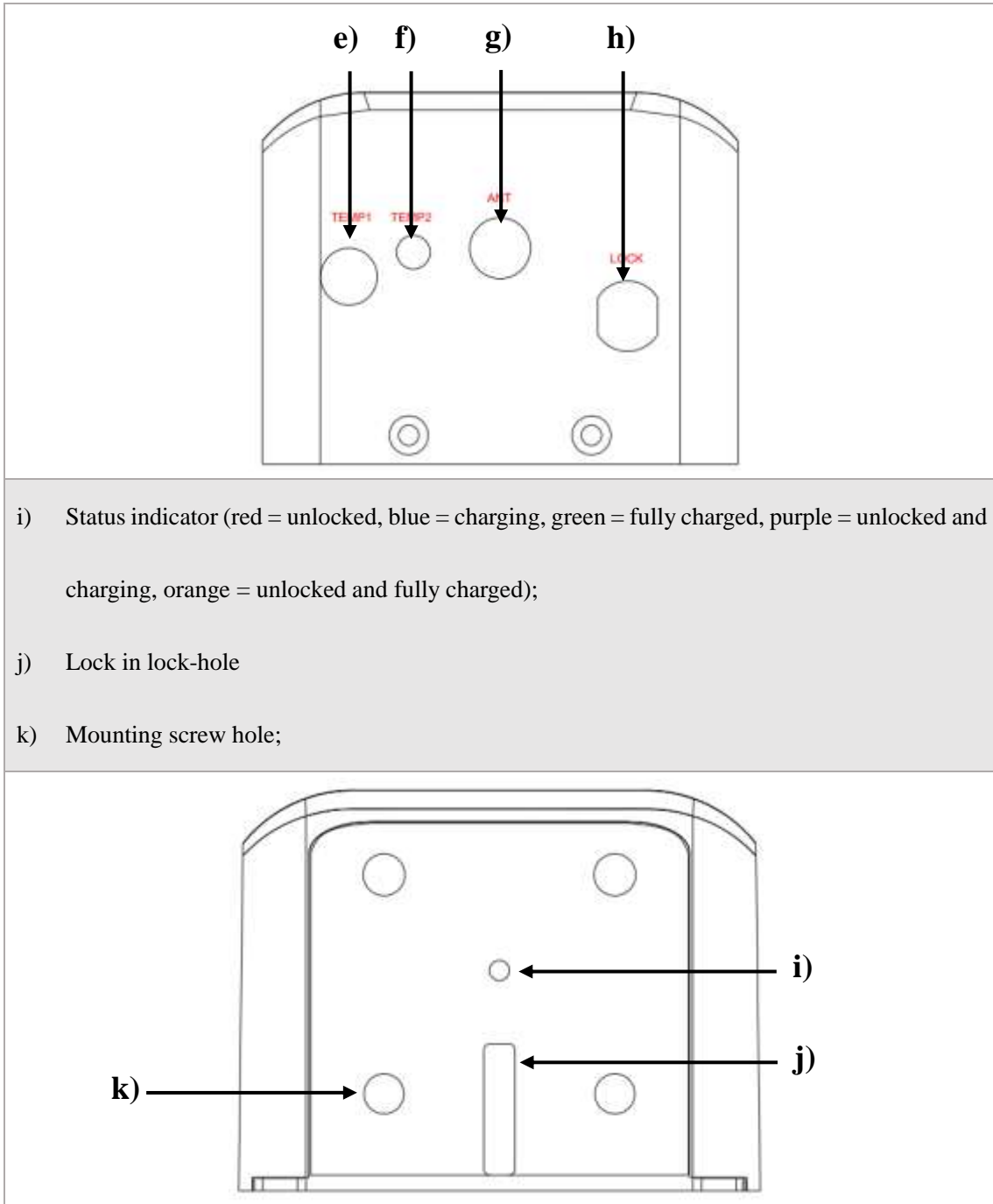| |
|---|
| a)   Charging port; |
| |
| b)   USB upgrade debugging port;

c)   Reset port;

d)   SN. label; |
| |
| e)   Normal temperature probe jack (optional);

f)   Ultra-low temperature probe jack of liquid nitrogen;

g)   Antenna jack;

h)   Emergency lock/ unlock |

e) f) g) h)

i) Status indicator (red = unlocked, blue = charging, green = fully charged, purple = unlocked and charging, orange = unlocked and fully charged);

j) Lock in lock-hole

k) Mounting screw hole;

i)

j)

k)

2.2 Equipment Parameters

Table 2 Equipment Parameters

Item	Parameter
Overall dimensions	83.8mm ×83.5mm ×64mm (L×W×H)
Weight	600g
Power supply mode	Powered by battery (chargeable)
Transmission method	Wireless
Transmission distance	1200 m in open area, 1000 m in streets, about 300 m inside buildings
Liquid nitrogen level detection	Detect the reaction liquid level through temperature
Resolution	0.1℃
Accuracy	±0.5℃（-200℃～-180℃）；
Data upload frequency	3 min/time (revisable)
Endurance (fully charged)	> 5 months
Storage temperature	0℃～50℃
Operating temperature	0℃～50℃

3   Basic Operation Instructions

3.1   Overview

MT200LM serves as the wireless transmitter, and each room shall be equipped with an MT500 receiver.

Note: An MT500 can receive multiple MT200LM data, but less than 100; due to the limited transmission range

of MT200LM, it is necessary to pay attention to the distance limit during its installation.

3.2   Operation Instructions

After MT200LM and MT500 devices are installed normally, users can download the "Laboratory Monitoring System" APP to view the temperature data tested; or view the temperature data through the computer web version. You can also view the corresponding data on a local PC; besides, you can perform fingerprint verification unlocking on the local PC to unlock it.

4 Installation Instructions

4.1 Parts List

Table 3 MT200LM Parts List

Name	Specification/ Quantity
Mounting Fixture Block A	C/2 D/1 E/1
Hinge	1
Hinge fixed end	D/1 E/1
Lock catch connecting plate	1
Lock catch	1
Fixed support	1
Intelligent lock	1
Countersunk hexagon socket head cap screw	M3*6/6
Countersunk hexagon socket head cap screw	M4*6/4
Countersunk hexagon socket head cap screw	M5*10/4
Cup head hex socket cap screw	M4*35/4
Antenna	1
Ultra-low temperature probe N100	1

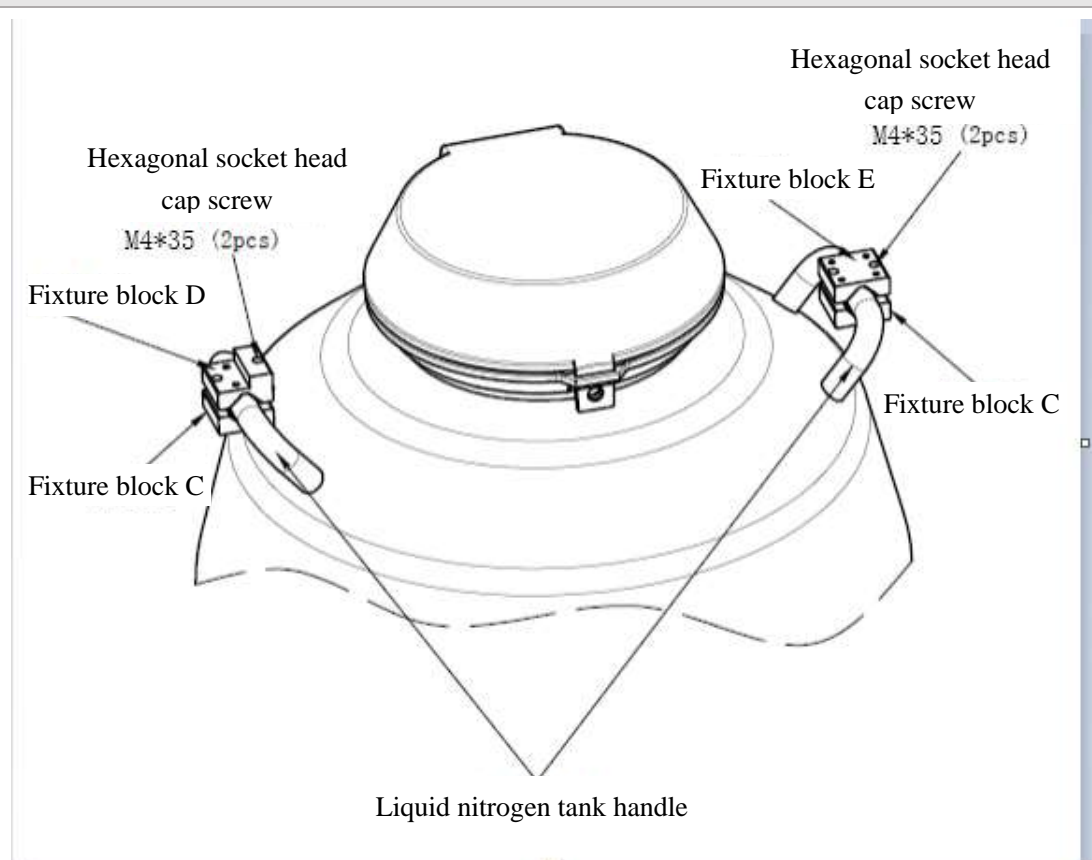### 4.2 Precautions before Installation

|	Before installation, please check the Parts List to ensure that the parts are complete;

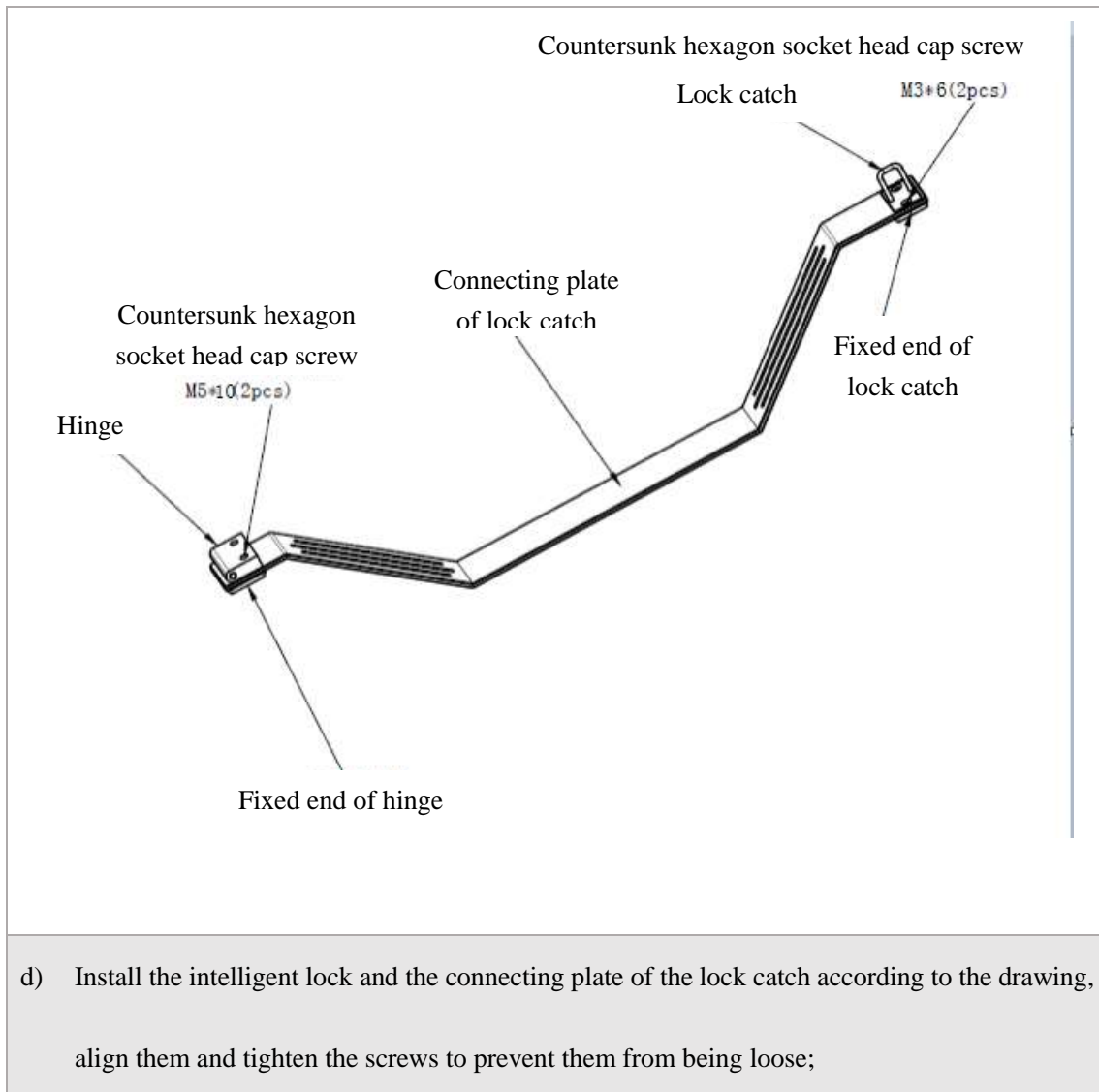|	Check whether the product is damaged.
	MT200LM, as a wireless transmitter, shall be equipped with a fingerprint all-in-one machine;
	MT200LM is restricted by transmission distance: Indoor wall-through distance is no more than 300m.

4.3 Installation Procedure of Structural Components

a) Install the fixture block according to the drawing, keep the end face of the fixture block level and in the middle of the handle, tighten the screws to prevent the fixture block from being loose during rotation (During the installation, the fixture block shall be aligned with lock catch bar to save time);
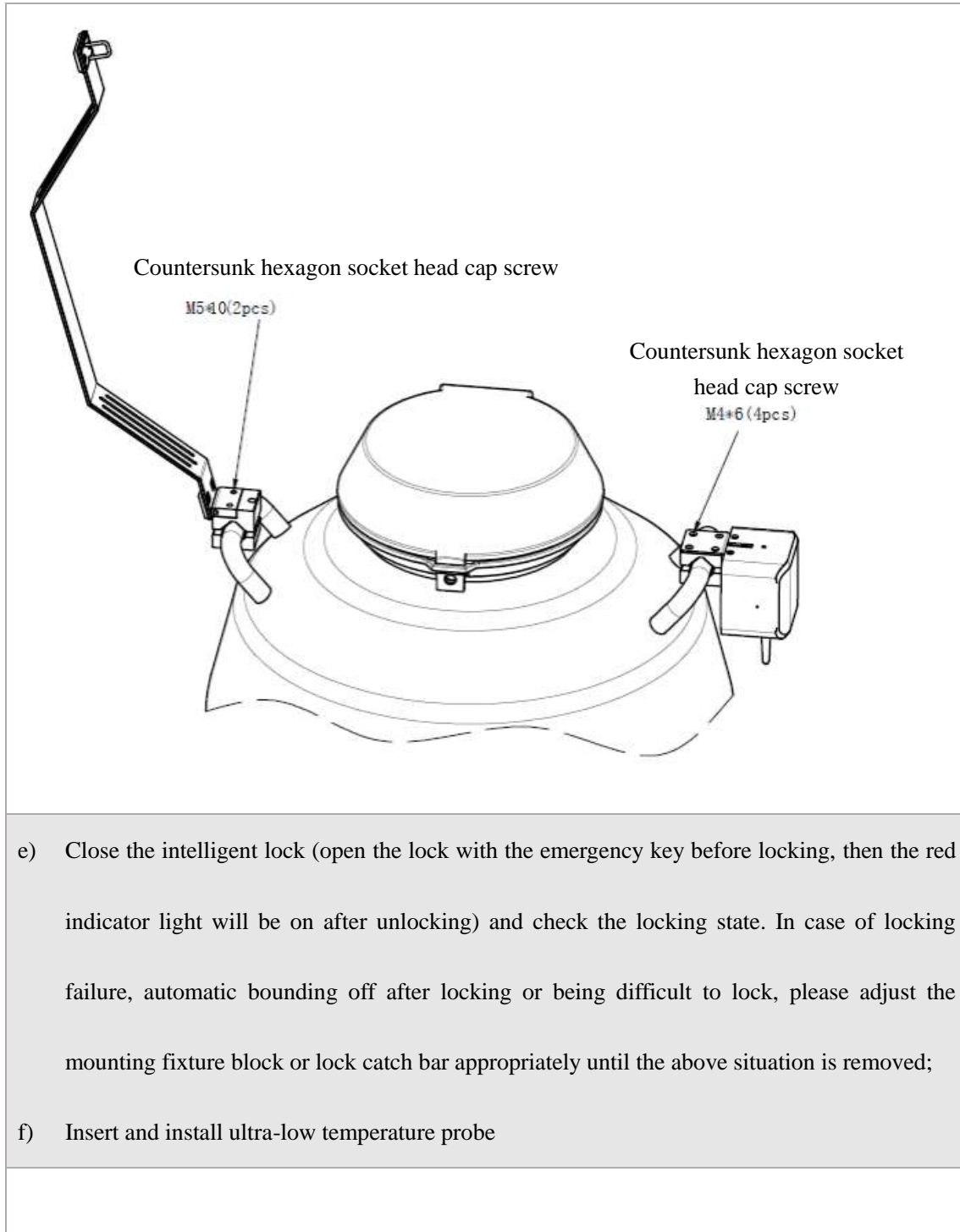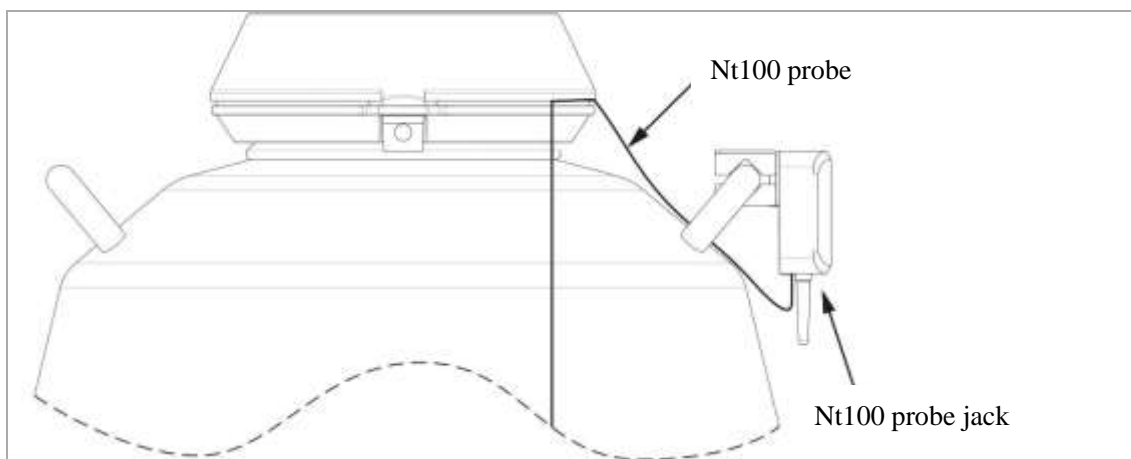
Hexagonal socket head cap screw
M4*35 (2pcs)

Hexagonal socket head cap screw
M4*35 (2pcs)

Fixture block E

Fixture block D

Fixture block C

Fixture block C

Liquid nitrogen tank handle

b) Install the intelligent lock according to the drawing and tighten the screws to prevent the lock

from being loose;

Intelligent lock

Fixed support

Countersunk hexagon socket head cap screw

M3*6(4pcs)

Antenna
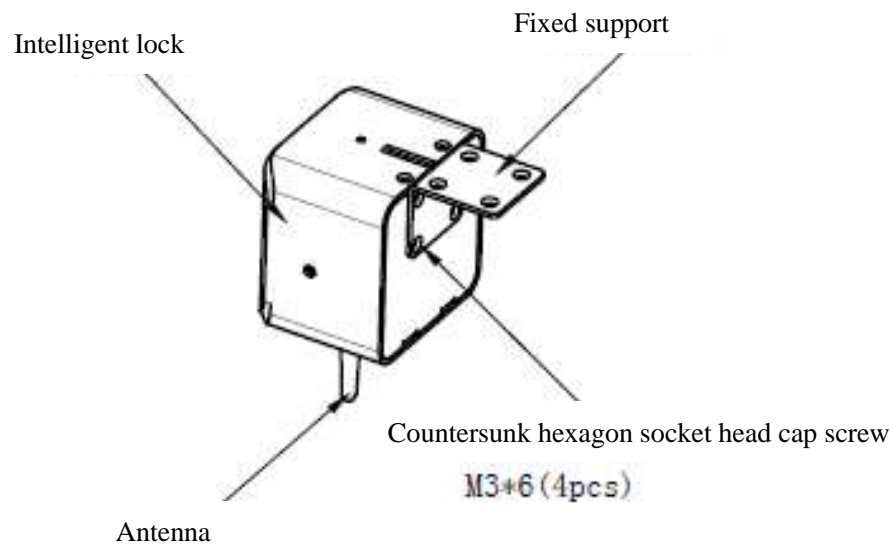
c) Install the connecting plate of the lock catch according to the drawing and tighten the screws to

prevent it from being loose;

Countersunk hexagon socket head cap screw

Lock catch

M3*6(2pcs)

Connecting plate
of lock catch

Countersunk hexagon
socket head cap screw

M5*10(2pcs)

Fixed end of
lock catch

Hinge

Fixed end of hinge

d) Install the intelligent lock and the connecting plate of the lock catch according to the drawing, align them and tighten the screws to prevent them from being loose;

Countersunk hexagon socket head cap screw

M5*10(2pcs)

Countersunk hexagon socket
head cap screw

M4*6(4pcs)

e)   Close the intelligent lock (open the lock with the emergency key before locking, then the red

indicator light will be on after unlocking) and check the locking state. In case of locking

failure, automatic bounding off after locking or being difficult to lock, please adjust the

mounting fixture block or lock catch bar appropriately until the above situation is removed;

f)   Insert and install ultra-low temperature probe

Nt100 probe

Nt100 probe jack

g) After connecting the touch screen all-in-one device or fingerprint terminal, check whether there are the data on the numbered liquid nitrogen tank on the monitoring software of the liquid nitrogen tank.
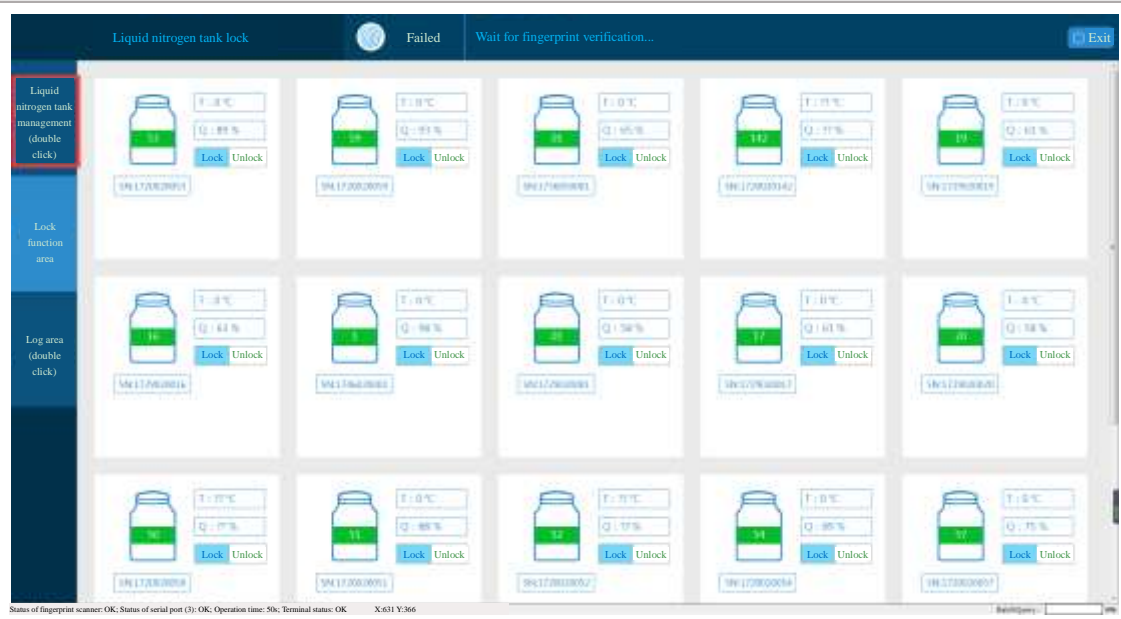
4.4 Software Installation Instructions

MT200LM liquid nitrogen tank intelligent monitoring system consists of two software:

- Fingerprint entry management software;

- Liquid nitrogen tank management software.

Introduction:

● The first-level administrator of the "Fingerprint entry management software" grants the relevant

personnel to have the operation authority of the "Liquid Nitrogen Tank Management Software";

● On the "Liquid Nitrogen Tank Management Software", implement the locking /unlocking operation

and level monitoring of the liquid nitrogen tank and the recording, management and monitoring of operation

processes and personnel through MT200LM.

4.4.1 Operation Instructions of Fingerprint Entry Management Software

1) Login Interface	
	Double click to open the fingerprint entry management software; the login interface will pop up, we will enter the login interface;

Note:

● For the first time, the default administrator account ID is admin and the default user name is

administrator (you do not need to enter this parameter because the software automatically identifies the user

name based on the ID), and the default password is 2008;

● Since then, you can log in with the account with the administrator permission (check "Available"

during the entry), the ID is the user account at the time of entry, the user name is the user name at the time of
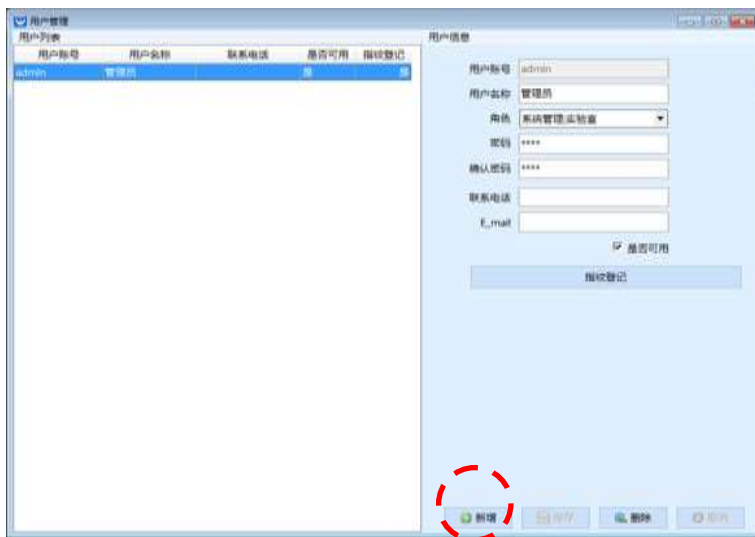
entry (you do not need to enter this parameter because the software automatically identifies the user name based on the ID), and the password is the password filled in at the time of entry; the instructions shall be specified in the next step;
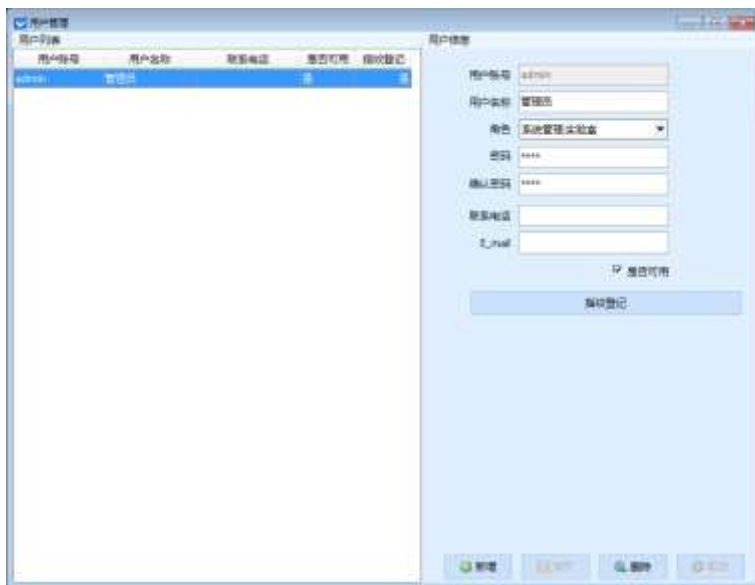
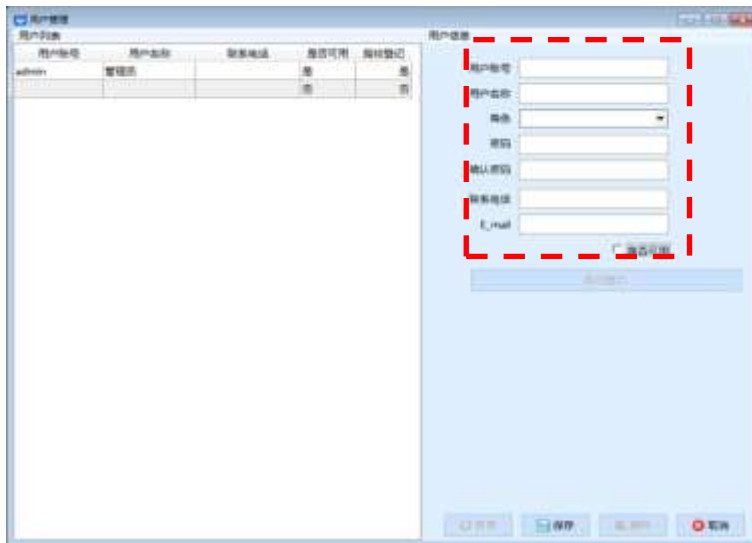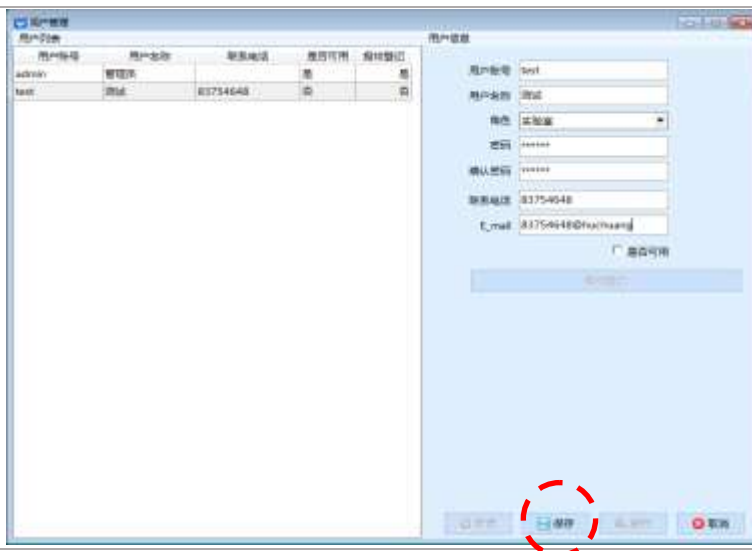|	
2) Main Interface	There is an administrator account by default. The password can be changed by the user, but "Available" must be checked, otherwise, the account cannot be used for login;
3) New User	STEP1 Click "New" button;

|	
	STEP2 Fill in user information on the interface; The role can be laboratory or system administrator. If not administrator, laboratory is selected; Whether to select "Available" determines whether to log in to the fingerprint management system; it is generally not selected for non-administrator; if selecting it, you must fill in the password for account login;
	STEP3 Click "Save" button.
4)　　Delete User	STEP1 Select the users to be deleted from user list;
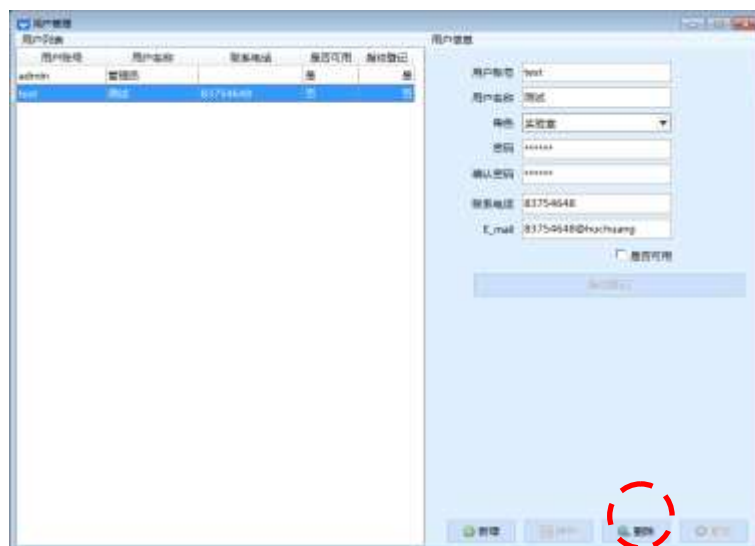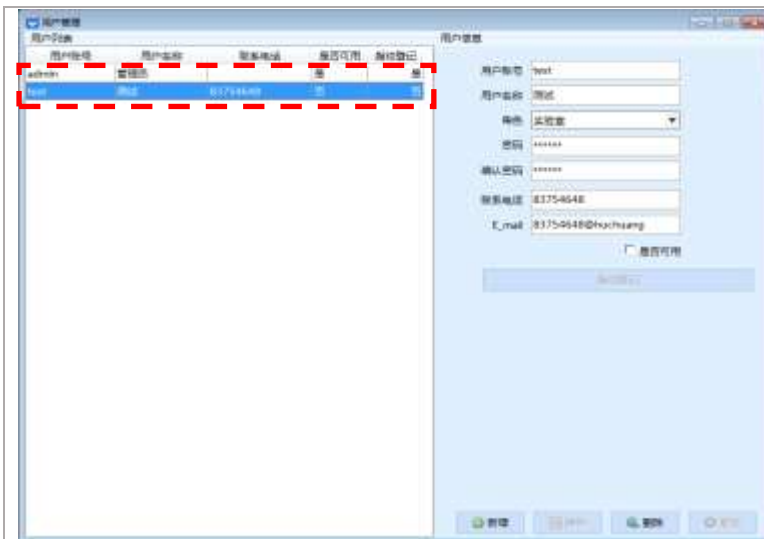
STEP2

Click "New" button;

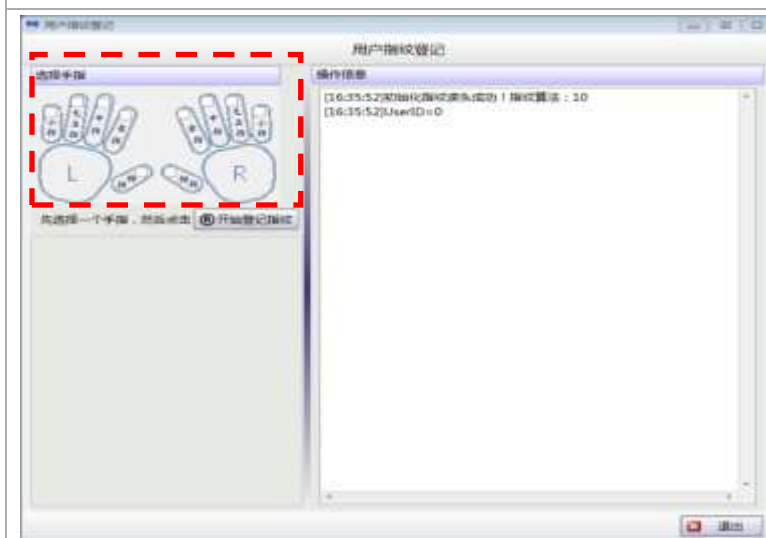5) Fingerprint entry
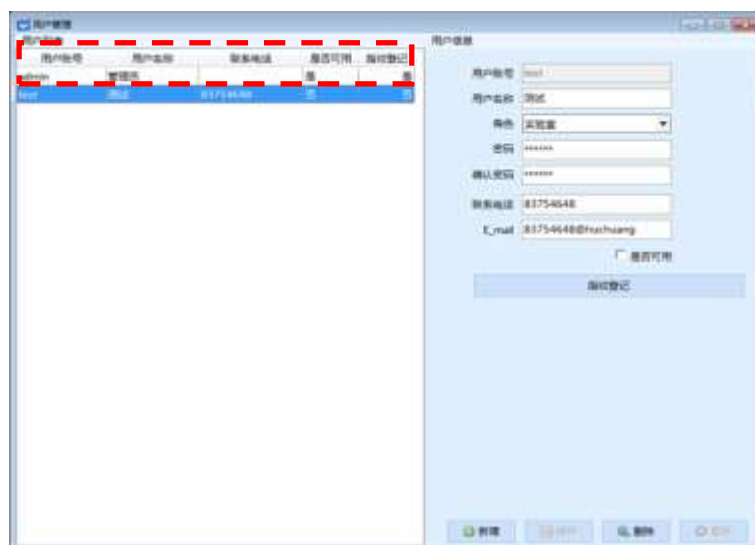
STEP1

Select the users with the fingerprint to be

entered in the user list;
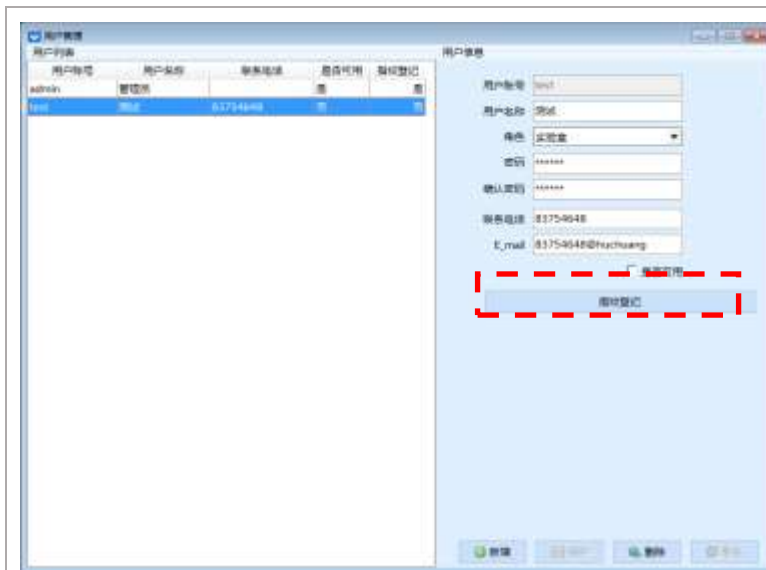
|	
	STEP2 Click "Fingerprint Registration" button;
	STEP3 Select the finger with fingerprint to be entered;
	STEP4 Click "Start false fingerprint registration" button;
Note: • Click "Fingerprint registration" button, put the corresponding finger on the fingerprint sensor to enter	

the fingerprint. Pay attention to the operation information. The fingerprint of each finger needs to be entered three times; if the fingerprint is entered successfully for three times, meaning that the fingerprint is entered successfully.
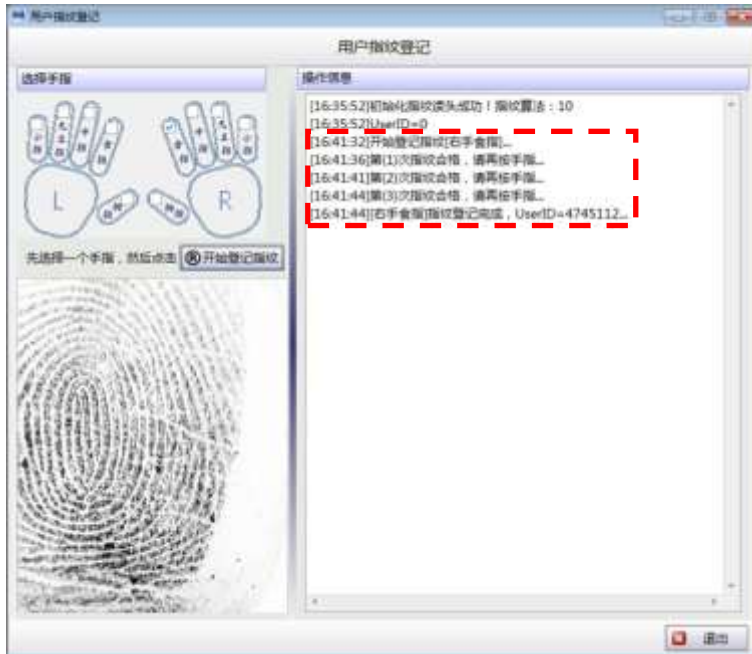
	STEP5 View the operation information and click "Exit" button after registration.

Note:

Fingerprints need to be entered one by one. If the fingerprints of multiple fingers need to be entered, you cannot click "Exit" button after entering the fingerprint of one finger, but tick the corresponding finger option to continue entry.

4.4.2 Operation Instructions of Management Software for Liquid Nitrogen Tank

1) Main Interface	Double click to open the liquid nitrogen tank management software to pop up the login interface; if no liquid nitrogen tank is not added, the left picture will be displayed. Icon of Management Software for Liquid

	Nitrogen Tank
	If no liquid nitrogen tank is not added, the left picture will be displayed; Note: If devices are added to the monitoring software, the software polls the temperature and battery level of all devices after being started.
2) **Main Interface Instructions** 	a) Operation area of menu; b) Display of fingerprint verification status; c) Real-time state display of liquid nitrogen tank; d) Status display area for viewing information on fingerprint reader, wireless host, operation time and terminal status.

3) Status Area Instructions of Liquid Nitrogen Tank	Detailed diagram of the status area of liquid nitrogen tank is shown in the main interface.

Remarks:

a) Display the tank name which can be defined by user;

b) The SN of the intelligent lock installed on the tank;

c) Display the liquid nitrogen temperature detected by the temperature sensor (the temperature measurement range of the temperature sensor is from -200 ℃ to +40 ℃; if no sensor is connected, no sensor is displayed; if the temperature is higher than -190℃, a red message is displayed. The default data upload frequency is 3 minutes per time). In addition, double-click here, you can immediately query the current temperature of the device;

d) Display the battery level of the intelligent lock installed on the tank (the data upload frequency and the temperature are consistent);

e) Display the switch status of the intelligent lock installed on the tank.

f) If N100LM normal temperature probe is equipped, the temperature difference will be displayed here;

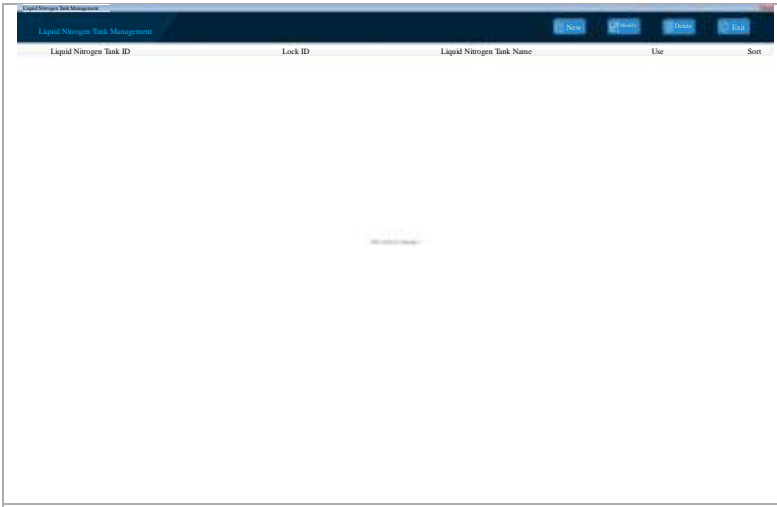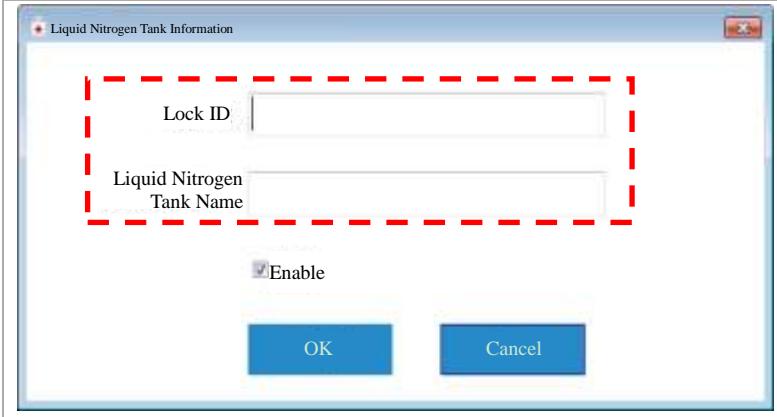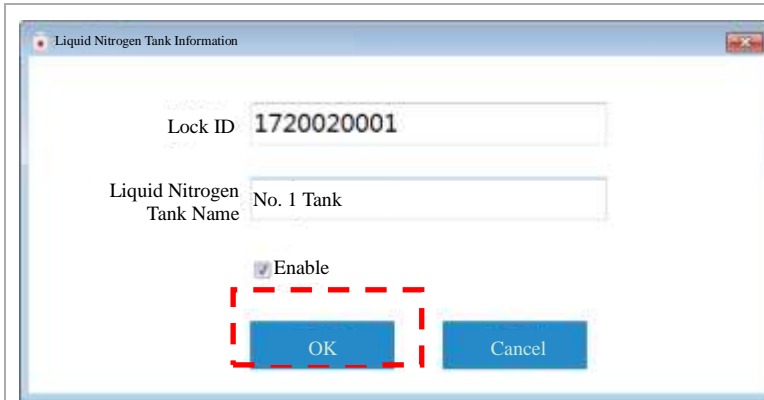|	
3) Management Menu of Liquid Nitrogen Tank 	STEP1 Double click "Management of Liquid Nitrogen Tank" button;
	STEP2 Double click "Management of Liquid Nitrogen Tank" button; Note: You need to enter the account and password of the administrator to enter the management interface of the liquid nitrogen tank management interface;
	STEP3 After the ID verification is successful, you can enter the management interface of the liquid nitrogen tank;

	Note: On this interface, you can manage the liquid nitrogen tank, and perform functions such as "New", "Modify", "Delete" and "Sort"
4) New Liquid Nitrogen Tank 	STEP1 Click "New" button;
	STEP2 Fill in the liquid nitrogen tank information to be added;

Notes:

- Lock ID is the 10-bit SN of the intelligent lock installed on the liquid nitrogen tank;

- The name of the liquid nitrogen tank shall be the name of the user's liquid nitrogen tank;

- If "Enable" is selected, the liquid nitrogen tank will be displayed on the main interface; otherwise, it will not be displayed.

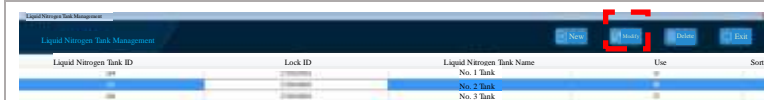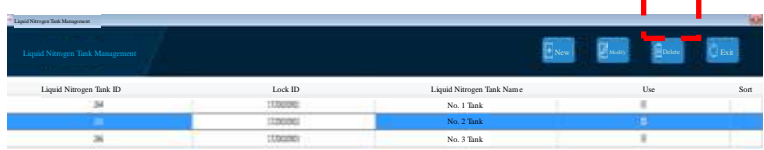|	
Liquid Nitrogen Tank Information Lock ID 1720020001 Liquid Nitrogen Tank Name No. 1 Tank ☑ Enable OK Cancel	**STEP3** After completing the information, click "OK" button to return to the management interface;
Liquid Nitrogen Tank Management New Modify Delete Exit Liquid Nitrogen Tank ID Lock ID Liquid Nitrogen Tank Name Use Sort No. 1 Tank No. 2 Tank No. 3 Tank	**STEP4** Select the liquid nitrogen tank to be modified first;
Liquid Nitrogen Tank Management New Modify Delete Exit Liquid Nitrogen Tank ID Lock ID Liquid Nitrogen Tank Name Use Sort No. 1 Tank No. 2 Tank No. 3 Tank	**STEP5** Click "Modify" button;
Liquid Nitrogen Tank Information Lock ID 1720020002 Liquid Nitrogen Tank Name No. 2 Tank ☑ Enable OK Cancel	**STEP6** Modify the information of the liquid nitrogen tank and then click "OK" button after modification.
6) Delete Liquid Nitrogen Tank **Liquid Nitrogen Tank Management** New Modify Delete Exit Liquid Nitrogen Tank ID Lock ID Liquid Nitrogen Tank Name Use Sort No. 1 Tank No. 2 Tank No. 3 Tank	**STEP1** Select the liquid nitrogen tank to be deleted;
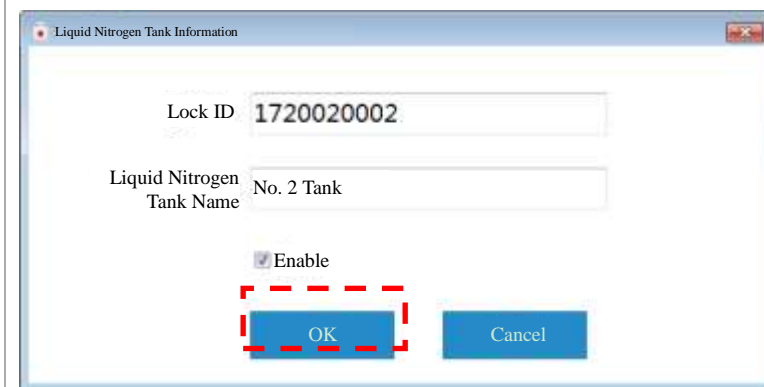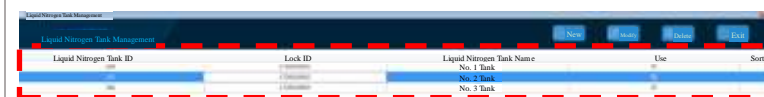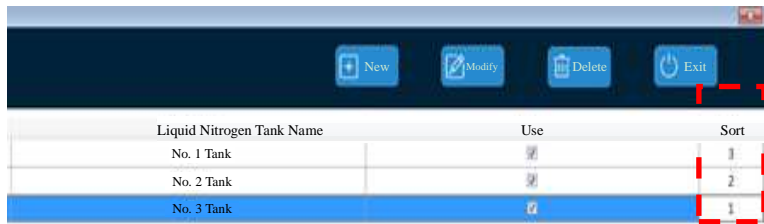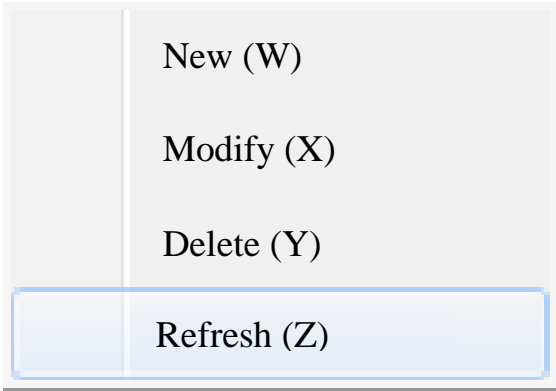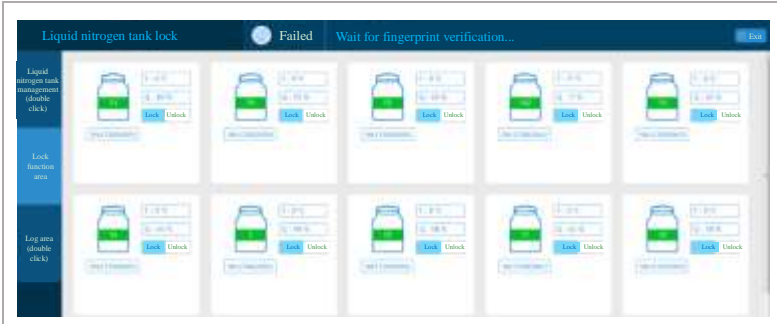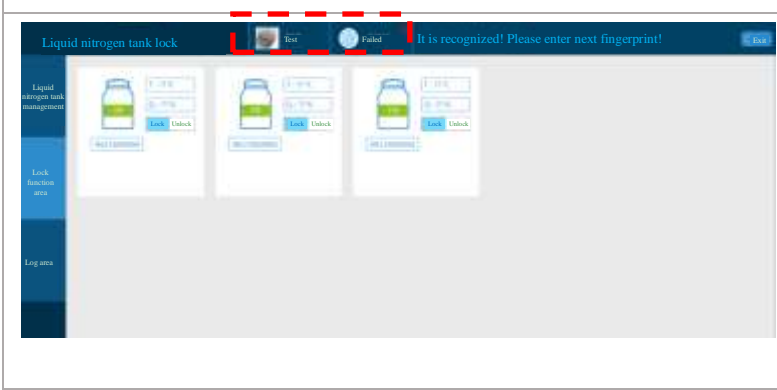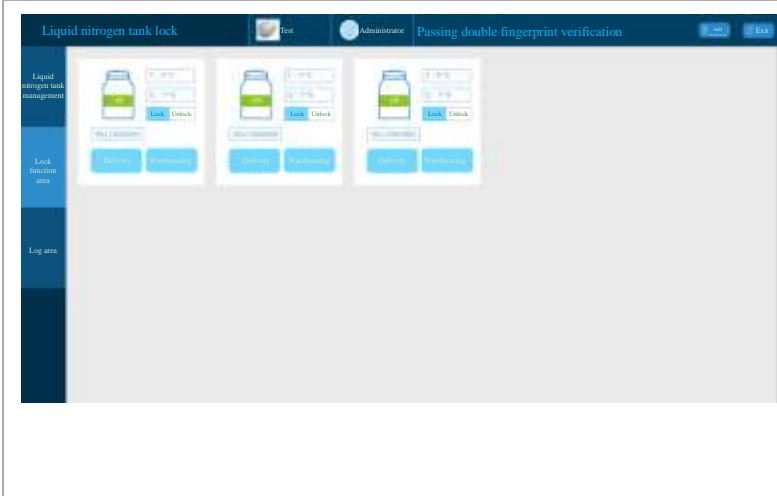
	STEP2 Click "Delete" button;
Note: If the historical data of the liquid nitrogen tank to be deleted exist, you cannot delete it. You can only modify it and do not use it.	
7) Sort Liquid Nitrogen Tank 	STEP1 On the management interface, enter the corresponding number (sorting order) in "Sort" column;
	STEP2 Right-click and click "Refresh" button, then the liquid nitrogen tanks will rearrange in order.
8) Lock Function Area	STEP1 Enter the display interface;

	STEP2 Fingerprint verification; In case of double fingerprint verification, note that the entry time of two fingerprints is 10 seconds. If the verification fails within 10 seconds, you need to re-verify the fingerprint;
	STEP3 After the ID verification is successful, you can enter the unlocking function interface. After the fingerprint verification is successful, three buttons will appear. On this interface, you can unlock (warehousing and delivery) the device and add liquid nitrogen in batches.
9)　Unlocking function (warehousing and delivery) 	**STEP1** Click the "Delivery" or "Warehousing" button at the bottom of the tank to be operated; After you click "Delivery" or "Warehousing" button, the system will implement unlocking function. The user needs to select "warehousing" and "delivery" functions

	STEP2

After about one second, the lock will be opened, and the lock information will be displayed on the interface. |

10) Add Liquid Nitrogen into Liquid Nitrogen Tank

	STEP1

Double click "Add Liquid Nitrogen" button; |
| | STEP2

Click "Yes" button in the second-level confirmation dialog box; |

Note:

- The design of the dialog second-level confirmation dialog box is to prevent all tanks are opened due to misoperation;

- After the user clicks "Yes" button, all the tanks will be opened in turn (the opening interval of tanks is about 1.5 seconds).
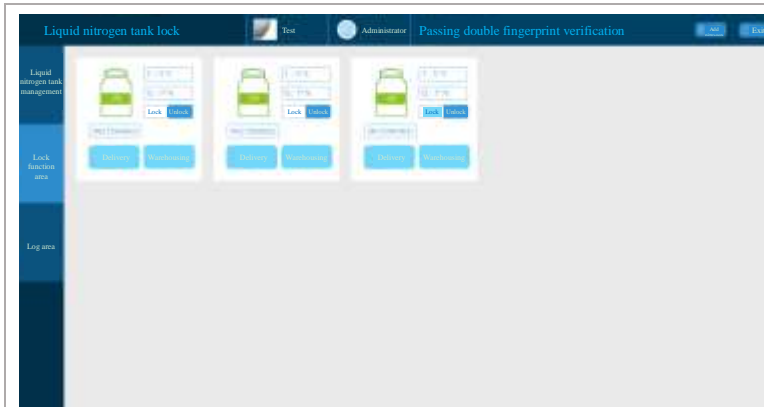
	STEP3 Check the unlocking status of all tanks.
11) Exit the operation state automatically or manually 	After the double fingerprint verification is successful, three operation buttons will be displayed on the interface, and the system will start time. When the operation time reaches the set value, it will automatically exit the operation state; Click the "Exit" button in the upper right corner to manually exit the operation state.
12) Log area 	**STEP1** Double click "Log area" button;

	STEP2
	Enter the account in the administrator login interface displayed to log in; Only administrator can view the log area. Therefore, the login verification is required
Log Management Query Date: From September 3, 2017 to From September 6, 2017 Query Export Exit	STEP3 The log information can be viewed after login; On this interface, you can search for operation records by time or export log records to an EXCEL table for later sorting.

Log Management table:

Lock ID	Liquid Nitrogen Tank Name	Unlocking Time	Unlocking Type	Keymaker 1	Keymaker 1	Unlocked?
	No. 3 Tank		Delivery	Tester	Administrator	
	No. 3 Tank		Delivery	Tester	Administrator	
	No. 3 Tank		Manual	Tester	Administrator	
	No. 3 Tank		Adding nitrogen	Tester	Administrator	
	No. 3 Tank		Adding nitrogen	Tester	Administrator	
	No. 2 Tank		Adding nitrogen	Tester	Administrator	
	No. 3 Tank		Adding nitrogen	Tester	Administrator	
	No. 1 Tank		Adding nitrogen	Tester	Administrator	
	No. 2 Tank		Adding nitrogen	Tester	Administrator	
	No. 2 Tank		Manual	Tester	Administrator	
	No. 1 Tank		Adding nitrogen	Tester	Administrator	
	No. 1 Tank		Manual	Tester	Administrator	
	No. 1 Tank		Manual			
	No. 1 Tank		Warehousing	Tester	Administrator	

13) Modify Operation Time	STEP1
	Double click "Operation Time" button;
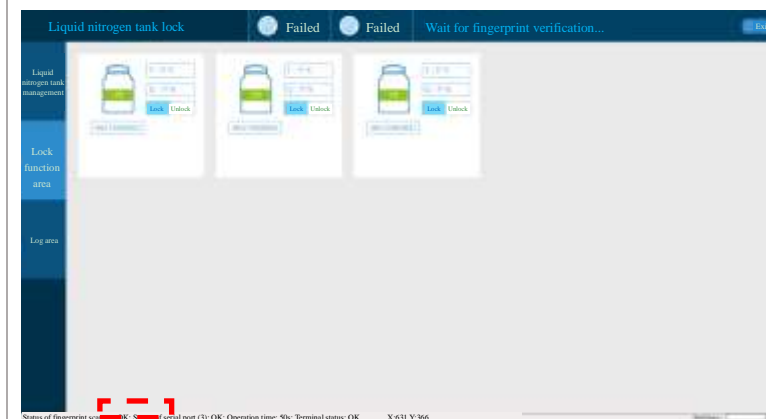
	STEP2 Enter the administrator account in the popup login interface to log in;
	STEP3 Modify the operation time and click "OK" button.

5 Equipment Maintenance

Equipment Maintenance
(1) The equipment contains precision components and shall be protected from falling off or crashing.
(2) The equipment contains important electronic components, only a small amount of water or liquid nitrogen spraying is allowed, and do not soak the equipment in water or liquid nitrogen directly for a long time.
(3) Do not put the equipment in a high temperature environment (higher than 60 ℃) because there are batteries inside the equipment.
(4) The equipment has wireless transmission function, so no large metal object is allowed to be placed on the device, otherwise the wireless signal will be shielded.
(5) The antenna of the equipment stretches out of the equipment; do not hit the

antenna, otherwise it is easy to break the antenna, thus affecting the wireless transmission of data.	

Lithium Battery Maintenance

(1) When the battery level is lower than 25%, it shall be charged in time.
(2) Lithium batteries may explode at high temperature. Do not put the device in a high temperature environment (higher than 60 ℃).
(3) After the lithium batteries are fully charged, unplug the charger in time to extend the battery life.

Maintenance of Lock Catch Bar

(1) The lock catch bar is made of steel and has a protective layer on the surface. Sharp objects should be avoided to prevent damage to the protective layer and rust on the lock bar.
(2) There is a hinge at the joint of the lithium lock bar, and no force verticall in the opening and closing direction is applied to the hinge to prevent damage to the hinge.
(3) The lock catch bar will be bounded off during unlocking the device opened, so no heavy object is placed on the lock catch bar, otherwise the lock cannot be opened normally.
(4) If the fixture block of the lock catch bar is loose, the screws should be fixed immediately, otherwise it will affect the normal opening of the lock.

6 Troubleshooting

Fault	Causes Analysis
The equipment failed to upload data	• The battery is used up and needs to be recharged. • Whether the antenna of MT200LM is damaged. • Too large transmission distance of MT500 results in poor

	reception signal.
	• Reset MT200LM and wait for 10 minutes to check whether it's normal.
Unlocking failed of equipment	• The battery is used up and needs to be recharged. • Whether the antenna of MT200LM is damaged. • Too large transmission distance of MT500 results in poor reception signal. • Unlocking software crash. • The connection between PC and MT500 is abnormal. • Plug and unplug the cable connecting MT500 to PC, restart the PC or unlocking software. • There are heavy objects on the lock catch bar. • The lock catch bar is installed in an offset position, causing too much resistance to unlock. • Reset MT200LM and wait for 10 minutes to check whether it's normal. • The fault cannot be removed, an emergency key shall be used to open the lock.
No temperature is detected after the temperature probe is inserted	• Check whether the software crashes, and try to restart the software. • Check whether the probe is inserted in properly: The probe shall be inserted quickly and completely, and the interval between insertion and removal of probe shall be not too short, more than 3 seconds (that is, the probe shall be unplugged 3 seconds or after it is inserted, or the probe shall be re-inserted 3 seconds or more after removal). • Check whether the seal film of the probe is damaged, otherwise replace the probe. • Check whether the

	probe connection wire is normal or broken, otherwise replace the probe • Insert the probe into another normal terminal device to check whether the temperature can be normally uploaded, otherwise, it means that the probe is faulty and needs to be replaced. • Check whether the MT500 connected with the PC is in a normal state.
After the MT200LM terminal is locked or unlocked, the corresponding lock status information on the monitoring software is not consistent	• Double click to the lock status information of the terminal device to view whether it can be synchronized. • Check whether the antenna of the device is damaged; if the antenna is damaged, it will affect the strength of the wireless signal and result in data loss. • Check whether the antenna on the terminal device is working properly, and there is no metal around to block the signal. • Check for software crash, and restart the software and try again.

7 Precautions

⚠	When adding liquid nitrogen, take care and prevent liquid nitrogen from splash into MT200LM;
	Do not use it in the environment below 0℃ for a long time.

➢ The transmission distance of MT200LM is limited and should generally not exceed 3 rooms. If the walls of the rooms are made of metal materials, it is better to install a data receiver in each room;

➢ When the battery level of MT200LM is lower than 25%, the power consumption will be faster. Please charge in time for the fear that the low-voltage protection of the battery acts and affect the use of the equipment;

➢ MT200LM is not waterproof, so the equipment shall not directly contact with liquid water or liquid

nitrogen;

> MT200LM is equipped with polymeric battery and shall be not allowed to contact the high temperature environment to prevent battery damage.

8 FCC   Warning

15.19 Labeling requirements.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

15.21 Information to user.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

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